

### Claims

1. A refrigeration system of an air conditioning apparatus to cool or heat air within a space by using phase change of refrigerant, the refrigeration system comprising:

- 5                   an expansion unit to execute adiabatic expansion of refrigerant;  
                  an indoor unit with a heat exchanger;  
                  a compressor to execute adiabatic compression of the refrigerant;  
                  an outdoor unit with a heat exchanger; and  
                  a bypass line connected between an inlet and an outlet of the compressor  
10               to bypass at least a part of the refrigerant discharged from the outlet of the  
                  compressor to the inlet of the compressor, when a pressure of the discharged  
                  refrigerant is lower than a preset level or the temperature of outside air of the  
                  compressor is lower than a preset level.

2. The refrigeration system of an air conditioning apparatus as set forth  
15               in claim 1, wherein refrigerant is condensed in the indoor unit or the outdoor unit  
                  is introduced into the expansion unit through at least one auxiliary evaporator for  
                  heat exchange, and a part of the refrigerant to be introduced into the expansion  
                  unit is expanded in at least one auxiliary expansion unit under the adiabatic  
                  condition, and supplied to the compressor through the auxiliary evaporator for  
20               heat exchange.

3. The refrigeration system of an air conditioning apparatus as set forth  
in claim 2, wherein the at least one auxiliary evaporator for heat exchange is  
comprised of a plurality of auxiliary evaporators which are connected to each  
other in series or in parallel with respect to the flow of the refrigerant.

- 25               4. The refrigeration system of an air conditioning apparatus as set forth  
in claim 2, wherein the at least one auxiliary expansion unit is comprised of a  
plurality of auxiliary expansion units which are connected to each other in series

or in parallel with respect to the flow of the refrigerant.

5. The refrigeration system of an air conditioning apparatus as set forth in claim 1, wherein refrigerant condensed in the indoor unit or the outdoor unit is introduced into the expansion unit through at least one auxiliary evaporator for heat exchange, in which a part of the refrigerant to be introduced into the expansion unit is expanded in at least one auxiliary expansion unit under the adiabatic condition, and the refrigerant discharged from the at least one auxiliary expansion unit is mixed with the refrigerant evaporated in the outdoor or the indoor, and supplied to the compressor through the at least one auxiliary evaporator.

6. The refrigeration system of an air conditioning apparatus as set forth in claim 5, wherein the at least one auxiliary evaporator for heat exchange is comprised of a plurality of auxiliary evaporators which are connected to each other in series or in parallel with respect to the flow of the refrigerant.

7. The refrigeration system of an air conditioning apparatus as set forth in claim 5, wherein the at least one auxiliary expansion unit is comprised of a plurality of auxiliary expansion units which are connected to each other in series or in parallel with respect to the flow of the refrigerant.

8. The refrigeration system of an air conditioning apparatus as set forth in claim 1, wherein refrigerant condensed in the indoor unit or the outdoor unit is introduced into the expansion unit through at least one auxiliary evaporator for heat exchange, in which a part of the refrigerant to be introduced into the expansion unit is expanded in at least one auxiliary expansion unit under the adiabatic condition, and the refrigerant discharged from the at least one auxiliary expansion unit and subjected to heat exchange in the at least one auxiliary evaporators is mixed with the refrigerant evaporated in the outdoor or the indoor and subjected to heat exchange in the expansion unit, and supplied to the

compressor.

9. The refrigeration system of an air conditioning apparatus as set forth in claim 8, wherein the at least one auxiliary evaporator for heat exchange is comprised of a plurality of auxiliary evaporators which are connected to each other in series or in parallel with respect to the flow of the refrigerant.

10. The refrigeration system of an air conditioning apparatus as set forth in claim 8, wherein the at least one auxiliary expansion unit is comprised of a plurality of auxiliary expansion units which are connected to each other in series or in parallel with respect to the flow of the refrigerant.

11. The refrigeration system of an air conditioning apparatus as set forth in claim 1, wherein refrigerant condensed in the indoor unit or the outdoor unit is introduced into the expansion unit through at least one auxiliary evaporator for heat exchange, in which a part of the refrigerant to be introduced into the expansion unit is expanded in at least one auxiliary expansion unit under the adiabatic condition, and the refrigerant discharged from the at least one auxiliary expansion unit is mixed with the refrigerant evaporated in the outdoor or the indoor and subjected to heat exchange in the expansion unit, and supplied to the compressor.

12. The refrigeration system of an air conditioning apparatus as set forth in claim 11, wherein the at least one auxiliary evaporator for heat exchange is comprised of a plurality of auxiliary evaporators which are connected to each other in series or in parallel with respect to the flow of the refrigerant.

13. The refrigeration system of an air conditioning apparatus as set forth in claim 11, wherein the at least one auxiliary expansion unit is comprised of a plurality of auxiliary expansion units which are connected to each other in series or in parallel with respect to the flow of the refrigerant.